

IN THE CLAIMS:

- 1 1. (Canceled): A cell-balancing circuit comprising:
2 a battery pack having a plurality cells arranged in a series;
3 a bridge connected around a first cell of the plurality of cells, including a bypass
4 resistor in series with a switch; and
5 a cell monitor/regulator having an input connected across the first cell for measur-
6 ing a charge of the first cell, wherein the cell monitor/regulator closes the switch when a
7 charge of the first cell equals a maximum value.
- 1 2. (Canceled): The circuit as set forth in claim 1 wherein the cell monitor/regulator in-
2 cludes a comparator that compares a relative voltage potential across the first cell with
3 respect to a reference voltage potential.
- 1 3. (Canceled): The circuit as set forth in claim 2 wherein the cell monitor/regulator in-
2 cludes a voltage divider connected across the first cell and having an output connected to
3 a first input of the comparator, and a reference voltage source that outputs the voltage po-
4 tential to a second input of the comparator.
- 1 4. (Canceled): The circuit as set forth in claim 3 wherein an output of the comparator is
2 connected to a lead of the switch, the switch being constructed and arranged so that the
3 switch closes when the comparator measures a voltage at the second input greater than a
4 voltage at the first input.
- 1 5. (Canceled): The circuit as set forth in claim 4 wherein the switch comprises a transis-
2 tor that is variably saturated in response to an output of the comparator.
- 1 6. (Canceled): The circuit as set forth in claim 1 further comprising battery pack termi-
2 nals located at respective opposing ends of the cells arranged in a series, and a charging

3 circuit, the terminals being connected to respective opposing leads of a charging circuit
4 so as to charge the cells.

1 7. (Canceled): The circuit as set forth in claim 6 wherein the charging circuit includes a
2 sense resistor located in line with one of the terminals, a voltage sensor that measures an
3 overall voltage across the sense resistor and a regulator that determines a maximum cur-
4 rent delivered to the battery pack by the charging circuit in response to a measured value
5 the overall voltage.

1 8. (Canceled): The circuit as set forth in claim 7 wherein the charging circuit and the
2 battery pack each receive current from a transcutaneous energy transmission (TET) mod-
3 ule implanted in a body and the battery pack is adapted to be implanted in the body.

1 9. (Canceled): The circuit as set forth in claim 8 wherein the battery pack is operatively
2 connected to a life-saving system implanted in the body.

1 10. (Canceled): The circuit as set forth in claim 9 wherein the life-saving system in-
2 cludes a heart treatment device.

1 11. (Canceled): The circuit as set forth in claim 1 wherein the cells comprise lithium
2 ion-type cells.

1 12. (Canceled): The circuit as set forth in claim 1 wherein each of the cells includes a
2 respective a bridge connected around each of the cells, including a bypass resistor in se-
3 ries with a switch, and a cell monitor/regulator having an input connected across each of
4 the cells for measuring a charge thereof, wherein the cell monitor/regulator closes the
5 switch when a charge of each of the cells respectively equals a maximum value.

1 13. (Canceled): The circuit as set forth in claim 12 wherein the cells comprise at least
2 six cells.

1 14. (Canceled): The circuit as set forth in claim 13 wherein the cells comprise lithium
2 ion-type cells.

1 15. (Canceled): A method for balancing charge levels comprising:
2 using a battery pack having a plurality of cells arranged in series;
3 bridging around a first cell of the plurality of cells with a bypass resistor and a
4 switch;
5 monitoring a charge level of one of the cells based upon an input connected across
6 the first cell; and
7 closing the switch when the charge level of the first cell equals a maximum value
8 so as to shunt charge current around the cell through the bypass resistor.

1 16. (Canceled): The method as set forth in claim 15 wherein the step of monitoring in-
2 cludes comparing a relative voltage potential across the first cell with respect to a refer-
3 ence voltage potential.

1 17. (Canceled): The method as set forth in claim 16 wherein the step of comparing in-
2 cludes providing cell monitor/regulator includes a voltage divider connected across the
3 first cell and having an output connected to a first input of the comparator, and a refer-
4 ence voltage source that outputs the voltage potential to a second input of the comparator.

1 18. (Canceled): The method as set forth in claim 17 further comprising connecting an
2 output of the comparator to a lead of the switch, the switch closing a path through the
3 bridge when the comparator measures a voltage at the second input greater than a voltage
4 at the first input.

1 19. (Canceled): The method as set forth in claim 18 further comprising saturating a tran-
2 sistor in response to an output of the comparator when the comparator measures a voltage
3 at the second input greater than a voltage at the first input.

1 20. (Previously Presented): A method for balancing charge levels comprising:
2 using a battery pack having a plurality of cells arranged in series;
3 bridging around a first cell of the plurality of cells with a bypass resistor and a
4 switch;
5 monitoring a charge level of one of the cells based upon an input connected across
6 the first cell, including comparing a relative voltage potential across the first cell with
7 respect to a reference voltage potential and wherein the step of comparing includes pro-
8 viding cell monitor/regulator includes a voltage divider connected across the first cell and
9 having an output connected to a first input of the comparator, and a reference voltage
10 source that outputs the voltage potential to a second input of the comparator;
11 closing the switch when the charge level of the first cell equals a maximum value
12 so as to shunt charge current around the cell through the bypass resistor;
13 connecting an output of the comparator to a lead of the switch, the switch closing
14 a path through the bridge when the comparator measures a voltage at the second input
15 greater than a voltage at the first input;
16 saturating a transistor in response to an output of the comparator when the com-
17 parator measures a voltage at the second input greater than a voltage at the first input; and
18 locating battery pack terminals at respective opposing ends of the series of the
19 plurality of the cells, and connecting respective opposing leads of a charging circuit to the
20 terminals at predetermined times so as to charge the plurality of cells.

1 21. (Original) The method a set forth in claim 20 further comprising connecting a sense
2 resistor in line with one of the terminals, and measuring an overall voltage across the
3 sense resistor and regulating a maximum current delivered to the battery pack by the
4 charging circuit in response to a measured value the overall voltage.

1 22. (Previously Presented): The method as set forth in claim 20 wherein the cells com-
2 prise lithium ion-type cells.

1 23. (Previously Presented) A method for balancing charge levels comprising:
2 using a battery pack having a plurality of cells arranged in series;
3 bridging around a first cell of the plurality of cells with a bypass resistor and a
4 switch;
5 monitoring a charge level of one of the cells based upon an input connected across
6 the first cell, including comparing a relative voltage potential across the first cell with
7 respect to a reference voltage potential and wherein the step of comparing includes pro-
8 viding cell monitor/regulator includes a voltage divider connected across the first cell and
9 having an output connected to a first input of the comparator, and a reference voltage
10 source that outputs the voltage potential to a second input of the comparator;
11 closing the switch when the charge level of the first cell equals a maximum value
12 so as to shunt charge current around the cell through the bypass resistor;
13 connecting an output of the comparator to a lead of the switch, the switch closing
14 a path through the bridge when the comparator measures a voltage at the second input
15 greater than a voltage at the first input;
16 saturating a transistor in response to an output of the comparator when the com-
17 parator measures a voltage at the second input greater than a voltage at the first input; and
18 monitoring each of the cells based upon an input connected across each of the
19 cells for measuring a charge of the each of the cells respectively, and providing a bridge
20 around the each of the cells, the bridge including a respective bypass resistor and a re-
21 spective switch and closing the respective switch when the charge of the each of the cells
22 equals a maximum value so as to shunt charge current around the each of the cells
23 through the respective bypass resistor.

1 24. (Original) The method as set forth in claim 20 wherein the cells comprise at least
2 six cells.

1 25. (Original) The method as set forth in claim 24 wherein the cells comprise lithium
2 ion type cells.

1 26. (Previously Presented): The method as set forth in claim 20 further comprising
2 operatively connecting the cells to a life-saving system and powering the life-saving sys-
3 tem with the cells.

1 27. (Original) The method as set forth in claim 26 further comprising implanting the
2 cells in a body and providing an external power source that transmits charging current to
3 the cells.

1 28. (Original) The method as set forth in claim 27 wherein the step of providing the
2 external power source includes transmitting energy through a skin layer of the body using
3 induction.

1 29. (Canceled) A multiple-cell rechargeable battery pack comprising:
2 a plurality of cells, each of the cells being interconnected in a series line between
3 a pair of opposing battery pack-end terminals adapted to receive a charge current on the
4 series line;
5 a respective cell monitor/regulator connected across each of the cells for measur-
6 ing a charge of the each of the cells; and
7 a respective shunt bridge connected across each of the cells including a switch
8 that selectively closes the shunt bridge to direct the charge current around the cell through
9 the series line in response to a measurement of the charge of each of the cells by the
10 monitor/regulator .

1 30. (Canceled) The battery pack as set forth in claim 29 wherein the cell moni-
2 tor/regulator includes a comparator that operates the switch to close when the charge re-
3 spectively exceeds a predetermined reference value.

1 31. (Canceled) The battery pack as set forth in claim 30 further comprising a casing
2 for enclosing the cells that is sealed and comprises a biocompatible material adapted for
3 implantation in a body.

1 32. (Canceled) The battery pack as set forth in claim 31 wherein the cells are con-
2 nected to, and receive the charging current from, a transcutaneous energy transmission
3 (TET) system adapted for implantation in a body so as to receive energy through a skin
4 layer of the body by induction.

1 33. (Original) A transcutaneous energy transmission (TET) system adapted for im-
2 plantation in a body and for powering an implanted life-saving device comprising:
3 an implanted TET module for receiving energy through the skin and transmitting
4 electricity derived from the energy to a life-saving device; and
5 an implanted rechargeable battery pack including a battery pack having a plurality
6 of series-arranged cells, having a bridge connected around a first cell, including a bypass
7 resistor in series with a switch, and a cell monitor/regulator having an input connected
8 across the first cell for measuring a charge of the first cell, wherein the cell moni-
9 tor/regulator closes the switch when a charge of the first cell equals a maximum value.

1 34. (Original) The TET system as set forth in claim 33 wherein the battery
2 pack is adapted to be charged when the implanted TET module receives energy from an
3 external TET transmitter and to discharge, so as to power the life-saving device when the
4 implanted TET module receives one of either no energy or insufficient energy.